VIDEO ARTICLE

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Photodetector based on n-MoS_2 Quantum Dots/ p-GaN with High Responsivity

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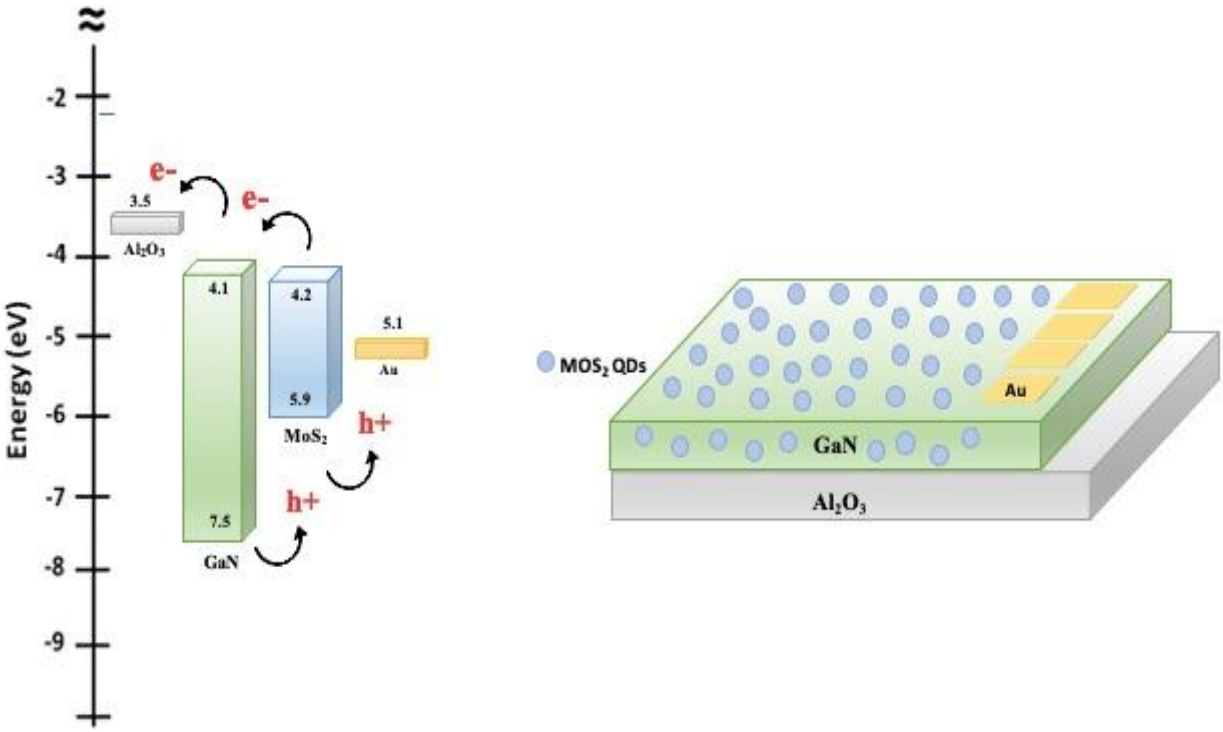
Graphical Abstract



Abstract

Transition metal dichalcogenides (TMDs)-based photodetectors have been widely documented in the literature, with molybdenum disulfide (MoS_2) being the most thoroughly investigated for photodetection applications. The main MoS_2 features direct bandgap transition in low-dimensional structures, high light-matter interaction, and good carrier mobility when combined with the ability to fabricate. The material MoS_2 has sparked interest in the field of optoelectronics. In this work, we have

successfully fabricated n-Mos$_2$\p-Gan heterojunction photodetector with high performance. Were MoS2 quantum dots (QDs) synthesized by using the liquid exfoliation method. characterized by X-ray diffraction (XRD), fluorescence emission spectra (FES), UV spectroscopy, and scanning electron microscopy (SEM), energy dispersive X-Ray (EDX). Transmission electron microscopy (TEM) and electrical (I-V) characterization appeared the responsivity and detectivity of the photodetectors. The QDs are spray-coated onto p-GaN Substrate. that photodetector is sensitive to infrared and deep ultraviolet (190-340 nm), and fluorescence emission spectra of MoS_2 QDs excitation peak investigate at 325 nm which is successfully confirmed extract MoS_2 QDs. And high responsivity, excellent detectivity. Furthermore, SEM images have shown the MoS_2 QDs with sizes ranging from (~ 4-11 nm). The QDs observed have a nearly spherical shape with a homogenous distribution. this study proved a cost-effective design method, high responsiveness, long-term environmental stability, and opens up new avenues for developing low-cost and broadband based TMDs photoelectric devices.

Keywords: Molybdenum disulfide, GaN, photodetectors, Transition Metal Dichalcogenides (TMDs).

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